

Listing of the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Amended): A method of processing a wafer having a process side and a back side, comprising:

removing un-wanted particles from the back side of the wafer in order to maintain the desired relationship between the backside of the wafer and a chucking surface;

placing the wafer on a chucking surface after removing the unwanted particles from the back side of the wafer;

etching the process side of the wafer after placing the wafer on the chucking surface and without performing any intervening processing steps between the etching and removal steps.

DI 2. (Cancelled)

3. (Cancelled)

4. (Original): The method as recited in claim 1 wherein the un-wanted particles are removed by cleaning the backside of the wafer in a dry cleaning process, semi-dry cleaning process or a wet cleaning process, and wherein the specific processing task is selected from etching, deposition or patterning.

5. (Presently Amended): A method of processing a wafer having a process side and a backside opposite the process side, the method comprising:

providing a semi-dry cleaning module for cleaning the backside of the wafer and a processing module for performing a processing task on the process side of the wafer;

receiving the wafer for processing;

performing a processing sequence consisting of

loading the wafer into the cleaning module;

cleaning the backside of the wafer in the semi-dry cleaning module to remove particles therefrom, wherein only the backside of the wafer is cleaned in the semi dry cleaning module so as not to damage the process side of the wafer;

transferring the wafer to the processing module;

loading the wafer into the processing module; and

etching the process side of the wafer in the processing module while the wafer is inside the processing module ~~without performing any intervening processing steps between the steps of cleaning the backside of the wafer and etching the process side of the wafer.~~

6. (Original): The method as recite in claim 5 wherein the wafer is a raw wafer or a previously process wafer.

7. (Cancelled)

8. (Cancelled)

9. (Previously Amended): The method as recited in claim 5 wherein cleaning the backside of the wafer in the semi-dry cleaning module comprises:

providing a brush for scrubbing the backside of the wafer and an applicator for delivering a cleaning solution to the backside of the wafer;

positioning the brush against the backside of the wafer;

flowing the cleaning solution between the backside of the wafer and the brush; and

moving the brush relative to the wafer so as to force particles off the backside of the wafer.

10. (Original): The method as recited in claim 9 wherein the cleaning solution is an alcohol based solution or a water based solution, and wherein the abrasiveness of the brush is configured to remove un-wanted particles without altering the backside of the wafer.

11. (Original): The method as recited in claim 5 wherein loading the wafer into the processing module comprises:

introducing the wafer into a process chamber of the processing module;

placing the wafer on a chuck disposed in the process chamber; and

holding the backside of the wafer relative to a top surface of the chuck,

wherein the unwanted particles are removed from the backside of the wafer to prevent gaps from forming between the backside of the wafer and the top surface of the chuck.

12. (Original): The method as recited in claim 11 wherein the wafer is held by an electrostatic force, a vacuum force, or a mechanical force.

13. (Original): The method as recited in claim 11 wherein performing the processing task in the processing module comprises:

providing a heat transfer system inside the chuck; and
distributing a heat transfer gas to the backside of the wafer via the heat transfer system,
wherein the unwanted particles are removed from the backside of the wafer to reduce
heat transfer gas backside faults caused by gaps formed between the backside of the wafer and
the top surface of the chuck.

14. (Original): The method as recited in claim 5 wherein the processing task is selected from
etching, deposition or patterning.

15. (Original): The method of claim 5 wherein the processing module is a plasma reactor.

16. (Original): The method as recited in claim 5 further comprising:

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providing a multiple cluster tool having a transport module, a load lock for holding a
plurality of incoming and outgoing wafers, and an aligner for aligning the wafer, the transport
module being arranged for transferring the wafer between the load lock, the aligner, the
processing module and the cleaning module;

loading a plurality of wafers into the load lock before loading the wafer into the cleaning
module;

transferring the wafer to the cleaning module;

transferring the wafer to the aligner after cleaning the backside of the wafer in the
cleaning module and before transferring the wafer to the processing module;

loading the wafer into the aligner; and

aligning the wafer in the aligner.

17. (Original): The method as recited in claim 5 further comprising:

providing an aligner for aligning the wafer inside the cleaning module;

providing a multiple cluster tool having a transport module and a load lock for holding a
plurality of incoming and outgoing wafers, the transport module being arranged for transferring
the wafer between the load lock, the processing module and the cleaning module;

loading a plurality of wafers into the load lock before loading the wafer into the cleaning
module;

transferring the wafer to the cleaning module;

aligning the wafer in the cleaning module after the backside of the wafer is cleaned in the cleaning module.

18. (Original): The method as recited in claim 5 further comprising:

providing a multiple cluster tool having a transport module, a load lock for holding a plurality of incoming and outgoing wafers, and an aligner for aligning the wafer, the transport module being arranged for transferring the wafer between the load lock, the aligner, and the processing module;

transferring the plurality of wafers to the load lock after the backside of each of the wafers is cleaned in the cleaning module;

loading the plurality of wafers into the load lock;

transferring the wafer to the aligner before transferring the wafer to the processing module;

loading the wafer into the aligner; and

aligning the wafer in the aligner.

19. Cancelled.

20. Cancelled.

21. (Previously Amended): A method of processing a wafer having a process side and a backside opposite the process side, the method comprising:

a providing a cleaning module for cleaning the backside of the wafer and a plasma reactor for performing an etching task on the process side of the wafer, the plasma reactor having a process chamber within which a plasma is formed for the processing task and a chuck for supporting the wafer during the processing task, the chuck being disposed inside the process chamber, the chuck including a heat transfer system;

b cleaning the backside of the wafer in the cleaning module to remove particles therefrom, wherein only the backside is cleaned so as not to damage the process side of the wafer;

removing the wafer from the cleaning module and thereafter introducing the wafer into the process chamber of the plasma reactor without performing any intervening processing steps therebetween;

placing the wafer on the chuck; and

holding the backside of the wafer relative to a top surface of the chuck with an electrostatic force, the cleaned backside of the wafer preventing undesirable gaps from forming between the backside of the wafer and the top surface of the chuck;

performing the etching task with the plasma on the process side of the wafer in the process chamber of the plasma reactor; and

distributing a heat transfer gas to the backside of the wafer via the heat transfer system during the etching task, the cleaned backside of the wafer reducing heat transfer gas faults caused by undesirable gaps.

D1 22. (Previously Added): The method as recited in claim 21 wherein the wafer is cleaned with a dry cleaning process.

23. (Previously Added): The method as recited in claim 21 wherein the wafer is cleaned with a semi-dry cleaning process.

24. (Previously Added): The method as recited in claim 21 wherein the wafer is cleaned with a wet cleaning process.

25. (New): A method of processing a wafer having a process side and a back side, comprising:

receiving a wafer for processing;

performing a processing sequence consisting of,

removing un-wanted particles from the back side of the wafer;

D2 placing the wafer on a chucking surface after removing the unwanted particles from the back side of the wafer, wherein removing un-wanted particles from the backside of the wafer maintains the desired relationship between the backside of the wafer and the chucking surface;

etching the process side of the wafer while the wafer is held on the chucking surface.
